STATEMENT OF NICK SABATINI, ASSOCIATE ADMINISTRATOR FOR AVIATION SAFETY
FEDERAL AVIATION ADMINISTRATION
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Chairman Mica, Congressman Costello, Members of the Subcommittee.

I am pleased to appear before you today to discuss a subject that serves to remind us that the future is now. The development and use of unmanned aircraft (UAs) is the next great step forward in the evolution of aviation. As it has throughout its history, FAA is prepared to work with government and industry to ensure that these aircraft are both safe to operate and are operated safely. The extremely broad range of UAs makes their successful integration into the national airspace system (NAS) a challenge, but certainly one worth meeting. To meet this vital need, the FAA has established an Unmanned Aircraft Program Office which has the expressed purpose of insuring a safe integration of UAs into the NAS.

At the outset, you must understand that UAs cannot be described as a single type of aircraft. UAs can be vehicles that range from a 12-ounce hand launched model to the size of a 737 aircraft. They also encompass a broad span of altitude and endurance capabilities. Obviously, the size of the UA impacts the complexity of its system design and capability. Therefore, each different type of UA has to be evaluated separately, with each aircraft's unique characteristics being considered before its integration into the NAS can be accomplished. FAA is currently working with both other government agencies and private industry on the development and use of UAs.

The number of government agencies that want to use UAs in support of their mandate is increasing. In addition to the Departments of Defense (DoD) and Homeland Security (DHS), the Department of Interior (DOI), the National Oceanic and Atmospheric Administration (NOAA) and state and local governments are all interested in increasing their use of UAs for a range of very different purposes. The certification of UAs by government agencies in the NAS is considered a public aircraft operation, the oversight for which falls outside the scope of the FAA. These public operations are, however, required to be in compliance with certain federal aviation regulations administered by the FAA and the FAA is and must be involved to ensure that the operation of these aircraft do not compromise the safety of the NAS. FAA's current role is to ensure that UAs do no harm to other operators in the NAS and, to the maximum extent possible, the public on the ground.

In working with government agencies, the FAA issues a certificate of authorization (COA) that permits the agency to operate a particular UA for a particular purpose in a particular area. In other words, FAA works with the agency to develop conditions and limitations for UA operations to ensure they do not jeopardize the safety of other aviation operations. The objective is to issue a COA with terms that ensure an equivalent level of safety as manned aircraft. Usually, this entails making sure that the UA does not operate in a populated area and that the aircraft is observed, either by someone in a manned aircraft or someone on the ground. In the interest of national security and because ground observers were not possible, the FAA worked with DHS to facilitate UA operations along

the Arizona/New Mexico border with Mexico. In order to permit such operations, the airspace is segregated to ensure system safety so these UA flights can operate without an observer being physically present to observe the operation. The FAA is working closely with DHS to minimize the impact of the segregation methods on other aviation operations. Such operations include DoD training missions, general aviation and commercial operations. In the past two years, the FAA has issued over 50 COAs. With the steadily expanding purposes for which UAs are used and the eventual stateside redeployment of large numbers of UAs from the theater of war, the FAA expects to issue a record number of COAs this year.

FAA's work with private industry is slightly different. Companies must obtain an airworthiness certificate by demonstrating that their aircraft can operate safely within an assigned flight test area and cause no harm to the public. They must be able to describe their unmanned aircraft system, along with how and where they intend to fly. This is documented by the applicant in what we call a program letter. An FAA team of subject matter experts reviews the program letter and, if the project is feasible, performs an on-site review of the ground system and unmanned aircraft, if available. If the results of the on-site review are acceptable, there are negotiations on operating limitations. After the necessary limitations are accepted, FAA will accept an application for an experimental airworthiness certificate which is ultimately issued by the local FAA Manufacturing Inspection District Office. The certificate specifies the operating restrictions applicable to that aircraft. We have received 14 program letters for UAs ranging from 39 to over 10,000 pounds. We have issued two experimental certificates, one for General Atomics'

Altair, and one for Bell-Textron's Eagle Eye. We expect to issue at least two more experimental certificates this year.

Each UA FAA considers, whether it be developed by government or industry, must have numerous fail safes for loss of link and system failures. Information must be provided to FAA that clearly establishes that the risk of injury to persons on the ground is highly unlikely in the event of failures or loss of link. Like everything else having to do with UAs, the methods that link the aircraft with ground control can be as simple as frequency line of sight or as complex as multiple ground and satellite paths making up a functional connection. If the link is lost, it means the aircraft is no longer flying under control of the pilot. Because FAA recognizes the seriousness of this situation, we are predominantly limiting UA operations to unpopulated areas. Should loss of link occur, the pilot must immediately alert air traffic control and inform the controllers of the loss of control link. Information about what the aircraft is programmed to do and when it is programmed to do it is pre-coordinated with the affected ATC facilities in advance of the flight so that FAA can take the appropriate actions to mitigate the situation and preserve safety.

The COA and Experimental Airworthiness Certificate processes are designed to allow a sufficiently restricted operation to ensure a safe environment, while allowing for research and development until such time as pertinent standards are developed. They also allow the FAA, other government agencies, and private industry to gather valuable data about a largely unknown field of aviation. The development of standards is crucial to moving

forward with UAs integration in the NAS. FAA has tasked the RTCA, an industry led federal advisory committee to FAA, with the development of a Minimum Aviation System Performance Standard (MASPS) for sense and avoid, and command, control and communication. These standards will allow manufacturers to begin to build certifiable avionics for UAs**.** It is expected that the MASPS for avionics will take three to four years to develop. Until there are set standards and aircraft meet them, UAs will continue to have appropriate restrictions imposed. In addition, the FAA is working closely with DoD and DHS to collaborate on the appropriate approach to certification standards.

Because of the extraordinarily broad range of unmanned aircraft types and performance, the challenges of integrating them safely into the NAS continue to evolve. Urgent future ground surveillance needs must be balanced with the ongoing air transportation operations. The certification and operational issues described herein highlight the fact that there is a missing link in terms of technology today that prevents these aircraft from getting unrestricted access to the NAS. Currently there is no recognized technology solution that could make these aircraft capable of meeting regulatory requirements for see and avoid, and command and control. Further, some unmanned aircraft will likely never receive unrestricted access to the NAS due to the limited amount of avionics it can carry because of weight, such as transponders, that can be installed in a vehicle itself weighing just a few ounces. Likewise, the performance difference with surrounding air traffic can present challenges. Some UA operate in airspace used primarily by jet aircraft that can fly at twice their speed, thus complicating the control of the airspace.

FAA is fully cognizant that UAs are becoming more and more important to more and more government agencies and private industry. The full extent of how they can be used and what benefits they can provide are still being explored. Over the next several years, when RTCA has provided recommended standards to the FAA, we will be in a position to provide more exact certification and operational requirements to UA operators. As the technology gap closes, we expect some UAs will be shown to be safer and have more access to the NAS. The future of avionics and air traffic control contemplates aircraft communicating directly with one another to share flight information to maximize the efficiency of the airspace. This could certainly include some models of UA. Just as there is a broad range of UA, there will be a broad range of ways to safely provide them access to the NAS. Our commitment is to make sure that when they operate in the NAS, they do so with no denigration of system safety

In our history, FAA and its predecessor agencies have successfully transitioned many new and revolutionary aircraft types and systems into the NAS. Beginning in 1937, we completed the U.S. certification for the first large scale production airliner (the DC-3), then went on to certify the first pressurized airliner (the Boeing B-307 in 1940), civil helicopter (Bell 47 in 1946), turboprop (Vickers Viscount in 1955), turbojet (Boeing 707 in 1958), as well as the supersonic transport (Concorde in 1979), and the advance wide-body jets of today (Boeing 747-400 in 1989). It seems appropriate that, as we begin a new century and new millennium, advances in aviation technology present us with another addition to the fleet with great potential - unmanned aircraft.

Mr. Chairman, FAA is prepared to meet the challenge. We will continue to work closely with our partners in government, industry and Congress to ensure that the National Airspace System has the ability to take maximum advantage of the unique capabilities of unmanned aircraft.

This concludes my prepared remarks. I will be happy to answer your questions at this time.